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IF IT FLIES, IT DIES

by

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The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Abstract of

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Current US military doctrine underemphasizes the serious problem of accidental shootdown of friendly and neutral aircraft. The doctrine depends on total air superiority to reduce the risk of aviation fratricide, but this is not always achievable. Future combat environments will increase the risk of aviation fratricide and make incidents more costly.

Aviation fratricide affects all levels of war, but operational level commanders control many of the contributing factors. Measures to prevent accidental shootdowns must not decrease integration or aggressiveness in combat, yet the current environment of casualty sensitivity and emphasis on joint and combined integration makes zero incidents the only acceptable goal.

Operational leaders can only accomplish this if they reject the ideas that aviation fratricide is inevitable and that technology alone is the solution. Increased awareness, through publications and improved documentation and reporting, is the first step of this process. The second step is for operational commanders to consider aviation fratricide contributing factors throughout the planning, preparation, and execution phases of combat.

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Thesis. Current US military doctrine underemphasizes the risk of fratricide against friendly or neutral aircraft. Future combat environments will increase the risk of accidental shootdowns and make them more costly, yet most military experts continue to address the problem as a primarily technical issue or ignore it all together. The effects of aviation fratricide on relative combat strength, employment strategy, morale, and public opinion may make even a single incident unacceptably costly. Operational commanders control many of the contributing factors that cause friendly or neutral shootdowns. In order to prevent accidental shootdowns, without decreasing integration or aggressiveness in combat, risk reduction measures must become a part of operational art.

Approach. In order to illuminate the problem of aviation fratricide, explore its causes, and suggest solutions aimed at the operational level of war, it is first necessary to define fratricide and discuss the effects it has on all levels of war. A brief history of aviation fratricide is the next essential element in developing a clear understanding of how the current situation and prevention techniques evolved. Then, armed with a solid situational awareness of the issue, it is possible to positively identify contributing factors and attack them at the operational level.

Definition. Accidental shootdown of friendly and neutral aircraft has many labels, including; fratricide, amicicide, friendly fire, and blue on blue.[1] The terms are interchangeable in military publications and professional journals. Fratricide is the most universally accepted, but definitions vary subtly depending on the source (service, joint, academic experts) and the type (air to air, air to ground, ship to ship, for example). The

US Army Training and Doctrine Command (TRADOC) definition is the most suitable to aviation fratricide:

> Fratricide is the employment of friendly weapons and munitions with the intent to kill the enemy or destroy his equipment or facilities, which results in unforeseen and unintentional death or injury to friendly personnel.[2]

This definition eliminates cases involving aircraft known to be friendly or neutral shotdown either intentionally (e.g. World War II allied ground forces shotdown their own aircraft in revenge for air to ground fratricide) or unintentionally (e.g. training accidents).[3] These cases indicate problems at the tactical level that do not have devastating effects on the operational level of war and are not preventable through operational art. The TRADOC definition should include death or injury to neutral personnel and damage to friendly or neutral equipment in order to properly cover all the aspects important to aviation fratricide. Aviation fratricide includes all cases of fratricide, as defined and modified above, that involve the engagement of air assets.

Effects. "The impact of amicicide on combat power is geometric, not linear."[4] In this statement Dr. Shrader, a retired Army lieutenant colonel and recognized leader in fratricide research, alludes to the effects that fratricide has on the operational level of war. An oft-repeated example of fratricide's operational impact is Stonewall Jackson's fratricidal death at Chancellorsville, but this event fails to describe the serious operational implications of fratricide.[5] Although the death of top leadership can undoubtedly change the outcome of a battle, campaign, or perhaps even a war, it is the inhibiting influence that fratricide can have on operational leaders and their forces that is most devastating, especially in the case of aviation fratricide. The most obvious effect is a reduction of

relative combat strength as a result of the destruction of friendly forces and the missed opportunity to destroy enemy forces. This will rarely have operational implications, but as air-power shifts to fewer, multi-role platforms, a single aircraft loss could severely limit overall force capabilities.

The impact of aviation fratricide on morale and combat effectiveness has a great influence on operational command. The fear, distrust, anger, and loss of confidence (self and leadership) that fratricide causes can result in dysfunction at all levels. Aviation fratricide, in particular, can result in a reluctance to operate in areas or with units perceived as risky. It can cause leaders to micromanage operations or impose exceedingly restrictive rules of engagement (ROE). These effects can result in employment strategies that limit maneuver and integration, lack aggressiveness, and surrender initiative.[6] The consequences are extremely grave considering the current doctrinal emphasis on joint integration. Increased dependence on combined operations will further increase fratricide sensitivity and will multiply the difficulty of integrating forces.

Fratricide can also influence operational leadership from above. US public opinion has become increasingly sensitive to casualties, especially in military operations other than war (MOOTW).[7] Self-inflicted losses can force the National Command Authorities to reevaluate the strategy and costs of military action as a result of lost public support. Recent history provides far better examples of fratricide's high level implications than the demise of General Jackson, and the most publicized cases involve aviation fratricide. The shootdown of an Iranian airliner by the USS Vincennes in 1988

and the shootdown of two US Army H-60 helicopters by two US Air Force F-15 fighters in 1994 are poignant evidence that the problem has not gone away. The operational reevaluation and disruption and overall loss of confidence resulting from these incidents clearly demonstrate the critical effects of aviation fratricide on the operational level of conflict. History has also shown that it is easier to prevent aviation fratricide, through operational control of the contributing factors, than it is to counter an incident's effects.

History. Aviation fratricide began with the advent of military aviation in World War I. Infantry units engaged friendly aircraft because of a total lack of coordination. When asked why they shot at their own aircraft, Russian foot soldiers stated that they did not think their country was capable of putting aircraft in the air.[8] The operational commander could have avoided this fratricide by disseminating information on aircraft integration or establishing visual identification ROE. Increased aircraft use in World War II led to a corresponding increase in aviation fratricide. Attempts at integrating air, sea, and land forces lacked coordination and cooperation, and resulted in disasters. In the 1943 airborne invasion of Sicily less than half of the paratroopers were able to reach the island and over 20% were killed due to friendly fire.[9] Greater operational level attention to command, control, and coordination could have prevented these horrendous losses, which haunted integration for the remainder of the war. Technology, with the advent of radar, increased the risk of aviation fratricide during World War II by extending the range of aircraft detection without extending the identification range. This detection-identification gap led to the engagement of returning British bombers by friendly fighters

and ground anti-aircraft sites.[10] Intelligent operational doctrine must counter the detection-identification gaps that continue to contribute to aviation fratricide today.

Aviation fratricide decreased while ground fratricide continued to be a major problem during Korea and Vietnam. Desert Storm continued this trend and resulted in zero incidents of aviation fratricide while ground fratricide appeared to increase. Understanding the reasons behind these trends and the perceptions they cause is essential to developing operational solutions to the problem.

Current Environment. Gulf War fratricide figures cause two perceptions. The first perception is that modern, long-range, high-lethality weapons drastically increase ground fratricide (the fratricide rate for Desert Storm was 17%).[11] When compared to the previously accepted standard fratricide rate of two percent it is easy to see why the Desert Storm figures cause concern. Recent research indicates that past fratricide incidents were not properly documented due to inadequate record keeping and intentional underreporting. Evidence from training center analysis and historical research indicates that 14% may be closer to the historical average and that rates as high as 20% were not unusual.[12] This does not make the Desert Storm figures acceptable, but it does show that ground fratricide may not have increased drastically because of new weapons technology.

The second perception is that improved doctrine and technology have eliminated the aviation fratricide problem. There are, however, three factors to consider when analyzing the reduction in aviation fratricide; technology, doctrine, and air superiority. The introduction of electronic identification systems for use in aircraft undeniably contributed to the decline of aviation fratricide incidents. The US Army is currently

pursuing similar technology for the protection of ground forces.[13] Yet, the Vincennes and H-60 incidents clearly show that technology is not always reliable and that the operational commander who depends on it is not doing all that he or she can to prevent aviation fratricide.

Doctrine for preventing aviation fratricide in integrated operations has steadily improved since World War II. It is common to safely integrate multiple air and ground assets using strong command and control (C2) procedures and command, control, communication, computer, and intelligence (C4I) systems. The figures from Desert Storm make it easy to believe that current doctrine for preventing aviation fratricide is more than adequate and needs no attention at this time. It is this belief that causes people to ask -- "how could this happen?"-- whenever friendly or neutral aircraft are shotdown. The answer lies in air superiority.

Air superiority is an often overlooked factor that has contributed to the lack of aviation fratricide in US combat operations since Korea. As US forces achieve higher degrees of air superiority in conflicts, there is a corresponding decrease in aviation fratricide.[14] It makes sense that you do not shoot aircraft down if only friendly aircraft are flying. This suggests that current doctrine depends on air superiority to prevent aviation fratricide. The incidents mentioned earlier indicate that this doctrine may not be adequate in the face of an enemy who presents a possible air threat.

Awareness. Gulf War experiences and perceptions caused fratricide prevention efforts to bore sight on ground incidents. This emphasis, although not misplaced, has resulted in a stagnation of aviation fratricide prevention doctrine. The Army, driven by a

perceived increase in ground fratricide during Desert Storm and a lack of preventative technology, has done an excellent job of raising fratricide awareness through writings in manuals, handbooks, and professional journals. The Navy (the lead department for aviation fratricide prevention under the Joint Management Plan on fratricide), Air Force, and Joint communities also focus on ground fratricide in their publications, specifically on close air support operations.[15] Unfortunately, aviation fratricide only receives attention when aircraft are accidentally shotdown. Even then it is only short lived attention, often focusing on human error, failed technology, or the inevitability of incidents as a cost of war. This underemphasis needs correction.

Awareness is the first step of the operational approach to solving aviation fratricide. Operational leadership must reject inevitability and give greater emphasis to the illumination of the causes and costs of aviation fratricide. The costs are too high to remain reactive. This process can begin with joint and individual service publications of all types, but aviation fratricide prevention must eventually become a part of the US military's joint doctrine publications. The second part of awareness is documentation of fratricide incidents. As mentioned earlier, fratricide reporting procedures had shortfalls in the past. Accurate reporting will avoid false perceptions and allow efforts to have proper focus. This documentation should not only come from actual combat sources, but also from realistic exercise data similar to that currently being collected by monitoring technology at the three US national training centers.[16]

Causes. The direct causes of aviation fratricide are at the tactical level. The innumerable reasons why a weapon might be aimed at a friendly aircraft and the trigger

pulled fall into two categories; lack of situational awareness and lack of positive identification. The Center for Army Lessons Learned (CALL) definition of these terms is appropriate for aviation fratricide.

> **SITUATIONAL AWARENESS:** The real-time accurate knowledge of one's own location [and orientation], as well as the locations of friendly, enemy, neutrals, and noncombatants. This includes awareness of the METT-T conditions that impact the operation.
>
> **POSITIVE IDENTIFICATION:** The immediate, accurate, and dependable ability to discriminate through-sight between friend and foe. Optimally this ability extends to maximum engagement and acquisition range, and neither increases vulnerability, nor decreases system performance.[17]

Forces use these capabilities to combat the "fog" and "friction" of war and to prevent errors during target engagement. Without situational awareness and positive identification at the tactical level, the risk of aviation fratricide increases. The operational commander must make every effort to provide his forces with an environment that will ensure the highest degree of both. Air superiority is one of the best ways to provide this environment, but one must consider other factors, especially when complete air superiority is not possible.

Positive identification involves a combination of technological and human capabilities. The operational commander does not directly control these capabilities, but he must consider identification limitations and how his decisions will affect them. Situational awareness, on the other hand, is directly influenced by decisions made at the operational level. In planning, preparing, and executing major operations or campaigns, the operational commander makes many decisions that will determine whether the environment in which battle is fought will promote or deter friendly situational

awareness. These decisions are where aviation fratricide prevention and operational art meet.

Risk Assessment. The CALL handbook on fratricide risk assessment identifies primary fratricide contributing factors and organizes them according to mission, enemy, terrain, troops and equipment, and time (METT-T). The idea is to use the factors as a checklist to determine when fratricide risk is high and then to guide the implementation of measures to reduce the risk.[18] Although the checklist is intended for use by company level ground commanders, many of the factors apply to operational level aviation fratricide. Using a similar checklist during the planning, preparation, and execution phases of combat would ensure that aviation fratricide risk factors are considered in operational level decisions. In *Friendly Fire: The Price of War*, C. H. Gats and others presented fratricide risk assessment factors in a combat phase format well suited for operational use.[19] Tailoring the format to aviation fratricide produces the following possible checklist:

AVIATION FRATRICIDE RISK FACTOR CONSIDERATIONS

Planning Phase

Commander's Intent	- clear and disseminated
Complexity	- integration - aircraft density - dependent on technology - air superiority
Intelligence	- enemy intent - enemy capabilities and characteristics - expectations disseminated
Rules of Engagement	- clear, appropriate, and disseminated
Theater	- regional weather/ terrain factors - C4I systems

C2	- clear chain of command - promote coordination
Time	- planning - tactical decisions

Preparation Phase

Rehearsals	- realistic expectations and uncertainties - test flexibility and integration - test C4I systems
Training	- integration - experience level and proficiency

Execution Phase

Feedback	- reassess uncertainties - update
Human Factors	- fatigue, stress, complacency - accountability

There are many parallels between this list and items that operational leaders already consider (the principles of war and other key planning considerations listed in current joint publications), but it is important that they think about how each decision will influence situational awareness at the tactical level.[20] This is necessary for any operation that may involve the engagement of aircraft, including MOOTW, which can actually increase the risk of aviation fratricide because of complacency and unfamiliar objectives and strategies.

Current Considerations. Reviewing the checklist in terms of recent operations will help to identify the operational considerations of specific interest to our current environment. Hindsight and a lack of stress and time constraints are advantages that the operational commander does not usually have. Adequate consideration of aviation

fratricide factors before military action will result in more effective risk reduction measures in combat.

The commander's intent has an overriding effect on aviation fratricide risk. If the intended end state is total airspace denial to the enemy, it follows that aircraft engagement will have priority and the risk of aviation fratricide will be high until air superiority is achieved. On the other hand, if the intent is to ensure that all airways remain open for safe use by all, the risk may be less. The operational commander must make sure that all forces with the ability to engage air targets understand the intent so that their actions will be predictable. The current trend is for the commander's intent to not trickle down far enough into the tactical level because of perceived security risks or a lack of proper dissemination flow.

Complexity (or simplicity) is a basic principle that has a direct link to situational awareness. Although complex integration is a force multiplier with today's complementary force capabilities, it also makes situational awareness difficult to achieve. There are several aviation fratricide questions that the operational commander must consider when balancing integration and complexity. Will the operational scheme require an aircraft density beyond our ability to safely control? How will technological failures affect coordination? Does the scheme depend on air superiority? Desert Storm was an example of successful complex integration. Airspace managers were tasked with as many as 900 aircraft flying in a theater containing a multitude of friendly air defense systems.[21] Analysis reveals that situational awareness was not complete in some missions and that success was dependent on air superiority and a cooperative enemy.

This indicates that the ability to safely control the airspace was exceeded and that a high risk of aviation fratricide existed, which could have resulted in losses if faced with electronic countermeasures or system failures.[22] The operational commander must judge how much his or her operational scheme can rely on chance.

The operational commander can use intelligence to greatly enhance situational awareness. A thorough understanding of enemy capabilities, characteristics, and intent will provide realistic expectations of enemy actions that can distinguish friendly or neutral aircraft profiles from those of enemy aircraft. The operational commander must ensure that these expectations are realistic and that the information penetrates to the engagement level. The danger of incorrect expectations out weighing other information is evident in the Vincennes incident. Expectations of Iran's intent to stage an air attack combined with beliefs about Iranian F-14 capabilities and characteristics convinced the tactical commander that an Airbus, climbing on an airway during a scheduled commercial flight, was an attacking F-14 descending towards his ship.[23] The tactical commander might have made a different decision with operational level emphasis of Iranian F-14 anti-ship capabilities or the use of commercial airways in the area of operations.

Rules of engagement alone cannot prevent aviation fratricide without being excessively restrictive. To prohibit aircraft engagement is an unrealistic approach, but to require visual identification before engaging will not prevent accidental shootdowns resulting from misidentification. The operational commander must ensure the ROE properly balance restrictiveness and complexity. He or she should revise (or request

revision) the ROE anytime he or she feels they are unclear or inappropriate. Misinterpreted ROE will increase the risk of aviation fratricide.

Theater considerations include terrain and regional weather conditions that can increase the risk of aviation fratricide. Areas with congested commercial air traffic or a predominance of hazy days, for example, require restrictive identification procedures. The operational commander must know the capabilities and limitations of the forces in the specific theater and plan with them in mind. Theater C4I system capabilities will also affect aviation fratricide prevention factors, such as C2, intelligence, and positive identification. Using the Vincennes incident again, the investigation reveals that several sensors had information indicating the true identity of the target, but the information did not reach the decision maker.[24] This indicates a shortfall in either the theater C4I systems or perhaps the C2 procedures.

Command and control plays a vital role in aviation fratricide prevention. The operational commander should assess the C2 structure to ensure appropriate information flow, decision level, and order compliance. Service parochialism or lack of a central authority will increase the risk of aviation fratricide. Use of liaisons and a joint force air component commander will help, but authority must remain at the proper level. In the wake of the Black Hawk shootdown, high level military officials considered the short chain of command (fighters did not have to gain permission from higher authority on the ground before engaging) a contributing factor.[25] Yet, this type of vertical approval is too restrictive in a high threat environment. These are the type of situational factors that the operational commander must assess and balance in the C2 structure.

High threat environments require shorter decision making times and lower decision levels. Although some would say that fewer minds mean less chance for human error, they also mean less information and thus less situational awareness.[26] A second time factor is the amount of time for planning, which determines the degree of attention available to aviation fratricide prevention. Time restraints increase the risk of aviation fratricide and require the operational commander to reduce other risk factors (complexity, ROE).

Limited time also limits the preparation phase. It is obviously better to discover problems with integration, systems, and training during a rehearsal than in combat. Realistic rehearsals test how well aviation fratricide prevention is incorporated and increase the situational awareness of tactical units. The operational commander needs to guide and monitor the conduct of rehearsals based on realistic expectations and uncertainties. He or she must evaluate overall training levels in terms of aviation fratricide risk and make adjustments in force employment or operational scheme where shortfalls exist or if rehearsals are not possible.

During the execution phase the operational commander must reassess all of the aviation fratricide risk factors in a feedback loop. As uncertainty resolves, constant monitoring and updating of intent, operational schemes, intelligence, ROE, conditions, and procedures will help maintain situational awareness. The human factors of fatigue, stress, and complacency all increase the risk of fratricide and must also be monitored. Fatigue and stress are prevalent in the heat of war, while the current MOOTW environment increases the risk of complacency. The flying of unqualified aircrew and

the lack of attention to helicopter operations seen in the AWACS involvement in the accidental downing of the Black Hawks in Iraq indicates that complacency contributed to the incident.[27] The operational commander cannot assume that these problems will be caught at the tactical level and should watch for trouble signs and take corrective action early, such as adjusting operational tempo or exerting discipline.

This brings up one final controversial consideration--accountability. Without it discipline will be hard to maintain, but it can cause excessive caution and morale problems.[28] Strategic level authorities may handle this issue as a matter of policy. If left to the operational commander, he or she must find the causes of all aviation fratricide incidents (and near misses) and hold negligent personnel accountable. In all recent aviation fratricide cases, complete investigations were conducted to determine causes and accountability. This trend toward holding individuals accountable will reduce the risk of aviation fratricide, but it can be carried too far.[29] The shootdown of KAL flight 007 resulted in a purge of the air defense forces of the Former Soviet Union.[30] This type of action is not normally warranted and is counter productive.

Conclusions. Aviation fratricide is a serious and multifaceted problem for the US military, but it is not an inevitable part of combat. Zero incidents is the only acceptable goal for the current environment of casualty sensitivity and emphasis on joint and combined integration. Current US military doctrine depends on complete air superiority to prevent aviation fratricide, but this is not always achievable. Current solutions place too much emphasis on technology and not enough on operational art. Increased awareness is the first step to reducing the risk. This requires greater coverage of the issue

in service and joint publications as well as better reporting and documentation of incidents. The second step is for operational leaders to consider aviation fratricide contributing factors during the planning, preparation, and execution phases of war. The risk of aviation fratricide will always be present in military actions. Controlling the risk with operational art can prevent incidents without degrading effective integration and aggressiveness in combat.

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